

In the Claims

1. **(withdrawn)** A composition comprising brine solution including an effective amount of a divalent cation, at least one pollutant and having a salinity between about 3% and about 15%, where the effective amount of the divalent cation is sufficient to produce a divalent to monovalent cation mole ratio of at least 0.05 in the brine solution and where the brine solution is capable of supporting and sustaining growth of a microbial culture capable of degrading the at least one pollutant.

2. **(withdrawn)** The composition of claim 1, wherein the divalent cation is selected from the group consisting of Mg^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+} , and mixtures or combinations thereof.

3. **(withdrawn)** The composition of claim 1, wherein the divalent cation is selected from the group consisting of Mg^{2+} , Ca^{2+} , Sr^{2+} , and mixtures or combinations thereof.

4. **(withdrawn)** The composition of claim 1, wherein the divalent cation is selected from the group consisting of Mg^{2+} , Ca^{2+} , and mixtures or combinations thereof.

5. **(withdrawn)** The composition of claim 1, wherein the divalent cation is Mg^{2+} .

6. **(withdrawn)** A brine solution comprising a divalent to monovalent cation mole ratio of at least 0.05 and having a salinity greater than or equal to about 3%, where the brine solution is capable of supporting and sustaining microbial growth.

7. **(withdrawn)** The composition of claim 6, wherein the divalent cation is selected from the group consisting of Mg^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+} , and mixtures or combinations thereof.

8. **(withdrawn)** The composition of claim 6, wherein the divalent cation is selected from the group consisting of Mg^{2+} , Ca^{2+} , Sr^{2+} , and mixtures or combinations thereof.

9. **(withdrawn)** The composition of claim 6, wherein the divalent cation is selected from the

group consisting of Mg^{2+} , Ca^{2+} , and mixtures or combinations thereof.

10.**(withdrawn)** The composition of claim 6, wherein the divalent cation is Mg^{2+} .

11.**(withdrawn)** The composition of claim 6, wherein the brine solution has a salinity between about 3% and about 15%.

12.**(withdrawn)** The composition of claim 6, wherein the brine solution has a salinity between about 3% and about 13%.

13.**(withdrawn)** The composition of claim 6, wherein the brine solution has a salinity between about 3% and about 10%.

14.**(currently amended)** A method comprising the steps of:
feeding a contaminated brine solution having a salinity greater than or equal to about 3% to a biological reactor containing a mixed bacterial culture capable of degrading at least one contaminant under anoxic/anaerobic conditions;
adding an effective amount of a divalent cation precursor to the reactor, where the effective amount of the divalent precursor is sufficient to maintain a divalent to monovalent cation mole ratio at a numeric value greater than or equal to about 0.05,
degrading the contaminant in the contaminated brine solution for a time and at a temperature sufficient to reduce a concentration of the contaminant at or below a desired concentration while maintaining a suitable nutrient environment in the reactor and while maintaining the ratio greater than or equal to about 0.05.

15.**(original)** The method of claim 14, wherein the reactor is sealed to reduce or eliminate oxygen from the reactor.

16.**(original)** The method of claim 14, further comprising the step of:
sparging or purging the reactor with an oxygen-free gas after feeding the brine solution and

optionally during the degrading step.

17.**(original)** The method of claim 14, wherein the gas is selected from the group of nitrogen, argon, and mixtures and combinations thereof.

18.**(original)** The method of claim 14, wherein the divalent cation precursor is selected from the group consisting of a soluble Mg^{2+} salt, a soluble Ca^{2+} salt, a soluble Sr^{2+} , a soluble Ba^{2+} salt, and mixtures or combinations thereof.

19.**(original)** The method of claim 14, wherein the divalent cation precursor is selected from the group consisting of a soluble Mg^{2+} salt, a soluble Ca^{2+} salt, a soluble Sr^{2+} , and mixtures or combinations thereof.

20.**(original)** The method of claim 14, wherein the divalent cation precursor is selected from the group consisting of a soluble Mg^{2+} salt, a soluble Ca^{2+} salt, and mixtures or combinations thereof.

21.**(original)** The method of claim 14, wherein the divalent cation precursor is a soluble Mg^{2+} salt.

22.**(original)** The method of claim 14, wherein the contaminant is selected from the group consisting of perchlorate, nitrate and mixture or combinations thereof.

23.**(original)** The method of claim 22, wherein the nutrient environment comprises adding an inorganic energy source or an organic energy source in amounts greater than a stoichiometric amount of electrons required to reduce the perchlorate and/or nitrate present in the brine solution for sustained microbial growth during the degrading step.

24.**(original)** The method of claim 23, wherein the inorganic energy source is selected from the group consisting of H_2 gas, a hydrogen delivery chemical, and mixtures or combinations thereof.

25.**(original)** The method of claim 23, wherein the organic energy source is selected from the group

consisting of acetate, ethanol, methanol, lactate, and mixtures or combinations thereof.

26.**(original)** The method of claim 14, wherein the contaminated brine solution is a perchlorate and/or nitrate contaminated ion-exchange regenerate brine.

27.**(currently amended)** A method comprising the steps of:

passing a waste water stream including at least one ion-exchangeable pollutant through an ion-exchange resin able of exchanging the pollutant ion for a non-pollutant ion for a predetermined time or until the resin is no longer able to exchange the pollutant ion with the non-pollutant ion;

stopping the waste water stream from passing through the resin;

passing a brine solution having a salinity greater than or equal to about 3% through the resin for a time sufficient to exchange all or substantially all of the pollutant ion with the non-pollutant ion to form a pollutant contaminated brine solution;

adding an effective amount of a divalent cation to the pollutant contaminated brine solution to adjust a divalent to monovalent cation mole ratio to a numeric value greater than or equal to 0.05 to form a stabilized, pollutant contaminated brine solution;

contacting the stabilized, pollutant contaminated brine solution with an effective amount of a pollutant degrading culture under anaerobic/anoxic conditions for a time and at a temperature sufficient to degrade a concentration of the pollutant to or below a desired concentration to form a crude treated brine solution; and

filtering the crude treated brine solution to remove the culture and to form a treated brine solution.

28.**(original)** The method of claim 27, further comprising the step of:

repeating the step of claim 26, where the brine solution comprises the treated brine solution.

29.**(currently amended)** A method comprising the steps of:

feeding a waste water stream including at least one ion-exchangeable pollutant with a first column including a first ion-exchange resin able of exchanging the pollutant ion for a non-pollutant ion for a predetermined time or until the resin is no longer to exchange the pollutant ion with the

5 non-pollutant ion;

6 switching the waste water stream feeding from the first column to a second column including
7 a second ion-exchange resin capable of exchanging the pollutant ion for a non-pollutant ion for a
8 predetermined time or until the resin is no longer to exchange the pollutant ion with the non-
9 pollutant ion;

10 passing a brine solution having a salinity greater than or equal to about 3% through the first
11 column for a time sufficient to exchange all or substantially all of the pollutant ion with the non-
12 pollutant ion to form a pollutant contaminated brine solution and to regenerate the first resin;

13 adding an effective amount of a divalent cation to the pollutant contaminated brine solution
14 to adjust a divalent to monovalent cation mole ratio to a numeric value greater than or equal to 0.05
15 to form a stabilized, pollutant contaminated brine solution;

16 contacting the stabilized, pollutant contaminated brine solution with an effective amount of
17 a pollutant degrading culture under anaerobic/anoxic conditions for a time and at a temperature
18 sufficient to degrade a concentration of the pollutant to or below a desired concentration to form a
19 crude treated brine solution;

20 filtering the crude treated brine solution to remove the culture and to form a treated brine
21 solution;

22 switching the waste water stream feeding from the second column to first column; and

23 repeating the above-identified steps.

1 30.(**currently amended**) The method of claim ~~27~~29, wherein the first and second ion-exchange
2 resins are the same.